

Application No. 10/669,287
Amendment dated December 08, 2006
Reply to Office Action of June 16, 2006

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A push-in interbody spinal fusion implant for at least in part linear insertion across the surgically corrected height of a disc space between two adjacent vertebral bodies of a spine, said implant comprising:

an upper member having a portion being at least in part arcuate adapted for placement toward and at least in part within one of the adjacent vertebral bodies, said upper member having at least one opening adapted to communicate with one of the adjacent vertebral bodies, said upper member having a proximal end and a distal end;

a lower member having a portion being at least in part arcuate adapted for placement toward and at least in part within the other of the adjacent vertebral bodies, said lower member having at least one opening adapted to communicate with the other of the adjacent vertebral bodies, said openings of said upper and lower members being in communication with one another and adapted for permitting for the growth of bone from adjacent vertebral body to adjacent vertebral body through said implant and being sufficiently sized and located to allow for interbody spinal fusion through said implant, said lower member having a proximal end and a distal end corresponding to said proximal end and said distal end of said upper member, respectively, and a length between said proximal and distal ends, said upper and lower members articulating therebetween adjacent one of said proximal ends and said distal ends of said upper and lower members and allowing for expansion of the height of said implant, said upper and lower members having a first position relative to one another allowing for a collapsed implant height during insertion of said implant

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into the spine and a second position relative to one another allowing for an increased height, said arcuate portions of said upper and lower members in the first position being angled to one another over a majority of the longitudinal length of said implant and forming at least a portion of one of a frusto-conical shape and the shape of a cylinder split along a horizontal plane through its mid-longitudinal axis with said upper member and said lower member being angled to each other along the length of said implant;

at least a portion of a bone-engaging projection is adapted for linear insertion formed on the exterior of each of said opposed arcuate portions of said upper and lower members for penetrably engaging the adjacent vertebral bodies and to facilitate securing said implant into the spine; and

at least one blocker adapted to cooperatively engage and hold at least a portion of said upper and lower members apart so as to maintain the increased height of said implant and resist the collapse of said implant to the collapsed implant height when said implant is in a final deployed position.

2. (original) The push-in implant of claim 1, further comprising a hollow defined between said upper and lower members in communication with said openings in each of said upper and lower members, said hollow being adapted to receive fusion-promoting substances.
3. (original) The push-in implant of claim 2, wherein said hollow has a width that is unobstructed by any mechanism for moving said blocker.
4. (original) The push-in implant of claim 2, further comprising a second hollow between said upper and lower members located between said blocker and said end of said implant proximate said blocker.
5. (original) The push-in implant of claim 3, wherein said implant has a constant width in both the collapsed height and the increased height.
6. (original) The push-in implant of claim 3, wherein said blocker is located at least in part between said upper and lower members.

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7. (original) The push-in implant of claim 3, wherein said blocker is located proximate at least one of said ends of said upper and lower members.
8. (original) The push-in implant of claim 3, wherein said blocker is adapted to cooperatively engage a tool used to move said blocker from an initial position to a final position to increase the height of said implant, said tool not being a part of said implant and being removed from said implant after moving said blocker into the final position.
9. (original) The push-in implant of claim 3, wherein said implant has a width and said blocker has a width less than the width of said implant.
10. (original) The push-in implant of claim 3, wherein each of said upper and lower members are adapted to cooperate with and to fixedly locate said blocker.
11. (original) The push-in implant of claim 10, wherein each of said upper and lower members have a track configured to permit said blocker to seat therein.
12. (original) The push-in implant of claim 11, wherein at least one of said tracks and said blocker are adapted to cooperate with each other to center said blocker along a longitudinal axis of said implant.
13. (original) The push-in implant of claim 3, wherein said blocker moves said arcuate portions of said upper and lower members from a first angled orientation to a second angled orientation relative to one another.
14. (original) The push-in implant of claim 3, further comprising a second blocker located between said upper and lower members for holding at least a portion of the upper and lower members apart where said second blocker is located.
15. (original) The push-in implant of claim 3, wherein said blocker is an expander adapted to expand said implant from a first collapsed height to a second expanded height when moved from a first to a second position.
16. (original) The push-in implant of claim 15, wherein said expander is located proximate said proximal ends of said upper and lower members.
17. (original) The push-in implant of claim 15, wherein said expander is located

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proximate said distal ends of said upper and lower members.

18. (original) The push-in implant of claim 15, wherein said hollow is substantially unobstructed by said expander extending along a substantial portion of the length of said hollow so as to permit growth of bone from adjacent vertebral body to adjacent vertebral body through said implant.
19. (original) The push-in implant of claim 15, wherein said expander is adapted to cooperatively engage a tool used to move said expander from an initial position to a final position to increase the height of said implant, said tool not being a part of said implant and being removed from said implant after moving said expander into the final position.
20. (original) The push-in implant of claim 15, wherein said expander is adapted to cooperatively engage a tool that rotates about an axis parallel to the longitudinal axis of said implant to rotate said expander to increase the height of said implant.
21. (original) The push-in implant of claim 20, wherein said expander rotates in a plane perpendicular to the longitudinal axis of said implant to increase the height of said implant.
22. (original) The push-in implant of claim 21, wherein said expander remains in the same location along the longitudinal axis of the implant when rotated.
23. (original) The push-in implant of claim 15, wherein said expander moves said arcuate portions of said upper and lower members from a first angled orientation to a second angled orientation relative to one another.
24. (original) The push-in implant of claim 15, wherein each of said upper and lower members are adapted to cooperate with said expander.
25. (original) The push-in implant of claim 24, wherein each of said upper and lower members have a track configured to permit said expander to rotate therein.
26. (original) The push-in implant of claim 25, wherein said track of said upper member and said track of said lower member are in the same plane.

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27. (original) The push-in implant of claim 25, wherein said track of said upper member and said track of said lower member are parallel to one another.
28. (original) The push-in implant of claim 25, where said track of said upper member and said track of said lower member are in a plane perpendicular to the longitudinal axis of said implant.
29. (original) The push-in implant of claim 15, wherein said upper and lower members structurally cooperate with said expander so as to keep said expander located within said implant.
30. (original) The push-in implant of claim 25, wherein at least one of said tracks of said upper and lower members has a cooperating surface, said expander having a corresponding cooperating surface that contacts said cooperating surface of said at least one track to orient said expander in a predetermined location.
31. (original) The push-in implant of claim 30, wherein said cooperating surfaces orient said expander within said implant such that the axis of rotation of said expander is parallel with the longitudinal axis of said implant.
32. (original) The push-in implant of claim 31, wherein said cooperating surfaces center said expander within said implant such that the axis of rotation of said expander coincides with the longitudinal axis of said implant.
33. (original) The push-in implant of claim 3, wherein said upper and lower members are configured to cooperate with one another so as to stop said upper and lower members from being moved apart from one another more than a predetermined distance.

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34. (original) The push-in implant of claim 24, wherein said upper and lower members are adapted to cooperate with said expander so as to center said expander within a cross section of the upper and lower members.
35. (original) The push-in implant of claim 25, wherein at least one of said tracks of said upper and lower members includes at least one side having a cooperating surface, said expander having a corresponding cooperating surface that contacts said cooperating surface of said at least one side to orient said expander in a predetermined location.
36. (original) The push-in implant of claim 35, wherein said cooperating surface of said at least one side is a detent and said corresponding cooperating surface of said expander is a projection.
37. (original) The push-in implant of claim 36, wherein said detent and said projection center said expander within said implant such that the axis of rotation of said expander coincides with the longitudinal axis of said implant.
38. (original) The push-in implant of claim 15, wherein said expander has a first height corresponding to the height of said expander when said implant is initially inserted into the spine, said expander having a second height corresponding to the height of said expander when said expander is moved into a final deployed position to increase the height of said implant, said second height being greater than said first height.
39. (original) The push-in implant of claim 15, wherein said expander has a depth dimension less than that of said first and second height of said expander.
40. (original) The push-in implant of claim 39, wherein said expander has a fixed shape during movement from an initial insertion position to a final deployed position within said implant.
41. (original) The push-in implant of claim 15, further comprising a second expander located between said upper and lower members for moving at least a portion of the upper and lower members away from one another to increase the maximum

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- height of said implant where said second expander is located.
42. (original) The push-in implant of claim 41, wherein said second expander rotates to increase the height of said implant.
43. (original) The push-in implant of claim 41, wherein said second expander is located proximate an end of said implant opposite said expander.
44. (original) The push-in implant of claim 41, wherein said implant has a longitudinal axis and said second expander rotates in a plane perpendicular to the longitudinal axis of said implant to increase the height of said implant.
45. (original) The push-in implant of claim 43, wherein said hollow is substantially unobstructed by said second expander extending along a substantial portion of the length of said hollow so as to permit growth of bone from adjacent vertebral body to adjacent vertebral body through said implant.
46. (original) The push-in implant of claim 43, wherein said second expander remains in the same location along the longitudinal axis of the implant when rotated.
47. (original) The push-in implant of claim 41, wherein said second expander is located proximate one of the proximal end and the distal end of said upper and lower members.
48. (original) The push-in implant of claim 47, wherein said hollow is unobstructed by said second expander extending along a substantial portion of the length of said hollow to permit growth of bone from adjacent vertebral body to adjacent vertebral body through said implant.
49. (original) The push-in implant of claim 47, further comprising a second hollow between said upper and lower member located between said second expander and said end of said implant proximate said second expander.

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50. (original) The push-in implant of claim 41, wherein each of said upper and lower members have a track within which said second expander rotates.
51. (original) The push-in implant of claim 50, wherein said track is configured to permit said second expander to rotate therein and then to move from side to side within said track.
52. (original) The push-in implant of claim 41, wherein said second expander has a first height corresponding to the height of said second expander when said implant is initially inserted into the spine, said second expander having a second height corresponding to the height of said second expander when said second expander is moved into a final deployed position to increase the height of said implant, said second height being greater than said first height.
53. (original) The push-in implant of claim 41, wherein said second expander has an upper surface, a lower surface, and side surfaces as defined when said second expander is positioned to increase the height of said implant, and said side surfaces intersecting said upper and said lower surfaces at two diametrically opposed junctions.
54. (original) The push-in implant of claim 53, wherein the difference between said first height and said second height of said second expander approximates the difference in height of said implant between said first position and said second position as measured proximate the location of said second expander.
54. (original) The push-in implant of claim 3, wherein said upper and lower members have walls contacting one another.
56. (original) The push-in implant of claim 54, wherein said walls are aligned parallel with the longitudinal axis of said implant.
57. (original) The push-in implant of claim 54, wherein said walls are at least in part overlapping.

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58. (original) The push-in implant of claim 3, wherein said upper and lower members have a rotational articulation therebetween adjacent one of said proximal end and said distal end of said upper and lower members.
59. (original) The push-in implant of claim 58, wherein said rotational articulation is at one of said proximal end and said distal end of said upper and lower members opposite said blocker.
60. (original) The push-in implant of claim 58, wherein said rotational articulation allows for expansion.
61. (original) The push-in implant of claim 60, wherein said rotational articulation allows for limited expansion.
62. (original) The push-in implant of claim 3, wherein one of said upper and lower members has an interior wall, which is unexposed, extending therefrom toward the other of said upper and lower members when said implant is in an initial insertion position, and when said implant is in a final position said implant has a shape such that each of said arcuate portions of said upper and lower members are separated by at least a portion of said interior wall, which now has an exposed side.
63. (original) The push-in implant of claim 62, wherein said upper and lower members have side walls for engaging each other.
64. (original) The push-in implant of claim 63, wherein said side walls of said upper and lower members are at least partially overlapping walls.
65. (original) The push-in implant of claim 62, wherein said arcuate portions of said upper and lower members form an angular orientation relative to one another when said implant is in the final position.
66. (original) The push-in implant of claim 62, wherein said arcuate portions of said upper and lower members when said implant is in the final position form one of a frusto-conical shape and the shape of a cylinder split along a horizontal plane through its mid-longitudinal axis with said upper member and said lower member

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being angled to each other.

67. (original) The push-in implant of claim 3, wherein said implant has an interior, at least one of said upper and lower members has a screw hole passing therethrough adapted to receive a screw passing from said interior of said implant into one of the adjacent vertebral bodies.
68. (original) The push-in implant of claim 67, wherein each of said upper and lower members has at least one screw hole passing therethrough adapted to receive a screw passing from said interior of said implant into the adjacent vertebral body in contact with each of said upper and lower members respectively.
69. (original) The push-in implant of claim 67, further comprising at least one screw adapted to pass from said interior of said implant through said screw hole and into the adjacent vertebral body to anchor said implant to the adjacent vertebral body.
70. (original) The push-in implant of claim 3, wherein said implant has a side surface when in a final position that is contoured to cooperate with another implant.
71. (original) The push-in implant of claim 70, wherein said implant and said cooperating other implant have a combined width therebetween less than the combined height of said implant and said cooperating other implant.
72. (original) The push-in implant of claim 3, further comprising a cap for closing one of said proximal end and said distal end of said upper and lower members, said cap having an exterior surface and an interior surface.
73. (original) The push-in implant of claim 72, wherein said interior surface of said cap has spaced slots about its circumference to facilitate a snap fit of said cap into said implant.
74. (original) The push-in implant of claim 3, wherein said implant comprises an artificial material other than bone.
75. (original) The push-in implant of claim 3, wherein said implant is made of an artificial material that is stronger than bone.

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76. (original) The push-in implant of claim 3, wherein said implant is made of an artificial material that is harder than bone.
77. (original) The push-in implant of claim 3, wherein said implant comprises bone.
78. (original) The push-in implant of claim 77, wherein said bone includes cortical bone.
79. (original) The push-in implant of claim 3, wherein said implant comprises bone growth promoting material.
80. (original) The push-in implant of claim 79, wherein said bone growth promoting material is selected from the group consisting of bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.
81. (original) The push-in implant of claim 3, wherein said implant is treated with a bone growth promoting substance.
82. (original) The push-in implant of claim 3, wherein said implant is a source of osteogenesis.
83. (original) The push-in implant of claim 3, wherein said implant is at least in part bioabsorbable.
84. (original) The push-in implant of claim 3, wherein said implant comprises metal.
85. (original) The push-in implant of claim 84, wherein said metal is ASTM material suitable for use in said push-in spinal fusion implant.
86. (original) The push-in implant of claim 84, wherein said metal includes titanium.
87. (original) The push-in implant of claim 3, wherein said implant comprises a plastic material.
88. (original) The push-in implant of claim 3, wherein said implant comprises a ceramic material.

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89. (original) The push-in implant of claim 3, wherein said implant is formed of a porous material.
90. (original) The push-in implant of claim 3, wherein said implant is formed of a material that intrinsically participates in the growth of bone from adjacent vertebral body to adjacent vertebral body through said implant.
91. (original) The push-in implant of claim 3, wherein at least a portion of said implant is treated to promote bone ingrowth between said implant and said adjacent vertebral bodies.
92. (original) The push-in implant of claim 3, in combination with a chemical substance to inhibit scar formation.
93. (original) The push-in implant of claim 3, wherein said blocker is an expander having an external thread, each of said upper and lower members having a threaded converging portion adapted to cooperate with said external thread of said expander to expand said implant from a first collapsed height to a second expanded height when said expander is rotated from a first to a second position.
94. (original) The push-in implant of claim 79, wherein said bone growth promoting material includes at least one of bone, bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.
95. (original) The push-in implant of claim 1, further in combination with a bone growth promoting material.
96. (original) The push-in implant of claim 95, wherein said bone growth promoting material includes at least one of bone, bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.